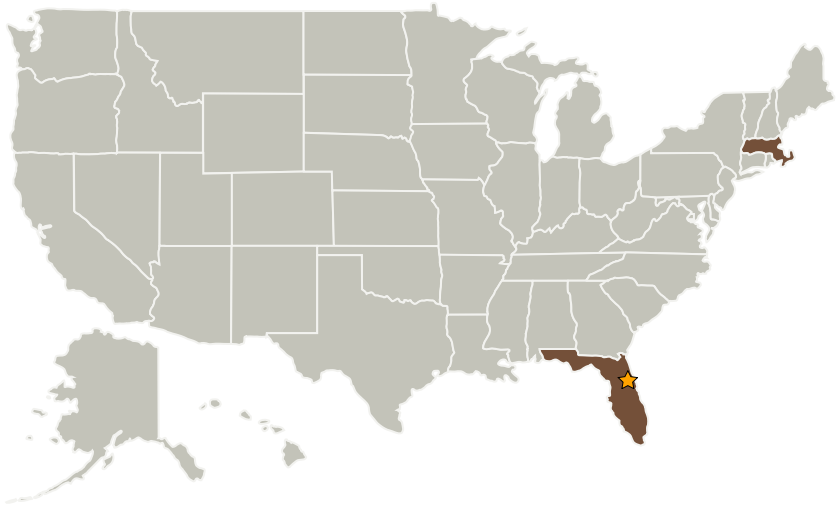
Ormosil Beads for Insulation of Ground Cryogenic Storage Tanks, Phase II

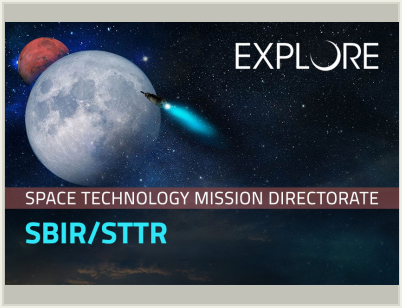
Completed Technology Project (2004 - 2006)

Project Introduction

Organically modified silica (Ormosil) aerogel beads developed at Aspen Aerogels, Inc. offer several advantages for retrofitting perlite insulation in NASA's ground tanks storing liquid hydrogen and oxygen. Through both Phase I and internal R&D efforts, polymethyl methacrylate (PMMA) and glutaraldehyde-crosslinked chitosan (GAC) hybrid silica aerogels were developed and evaluated. The hydrophobic aerogel beads have excellent compression strength, resisting thermal cycling and mechanical loads without breaking or settling. Investigations of the thermal performance of hybrid aerogel beads by nitrogen boil-off tests and the mechanical strength by compression tests have shown that carbon-opacified PMMA beads of diameter below 1 mm outperform perlite to the greatest extent. The Phase II work will continue with PMMA systems to optimize the formula and to determine the processing conditions required for controlling bead size distribution and achieving the desired thermal and mechanical performance characteristics. A scale-up of the process is planned to achieve pilot volumes (30-50 liters/hour). We will also demonstrate reproducibility in final bead performance through study of raw material variability (lot-to-lot) and process settings (batch-to-batch).

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Aspen Aerogels, Inc.	Supporting Organization	Industry	Northborough, Massachusetts

Primary U.S. Work Locations	
Florida	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors